Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)
included contingency welders in planning stage to be on site during discovery.	X		Consider again for next turnaround, need more
Significant amount of pre pull feed extra work impacted the planning process.		X	Determine root cause and implement system changes.
good job by the core team to resolve any extra work decisions in less than 24 hrs	X		keep as a philosophy for future T/A's
Ops and maintenance not on the same page for connecting blowdown piping, led to delays during step to drain water.		X	Consider connecting blowdown/N2/steam out piping ahead of time so there are no delays during shutdown window.
Event web page helped with refinery-wide communication.	X		Consider again for next turnaround,
H2S alarm caused mass confusion on night shift		X	this should be part of safety training in future t/a's for both contractor and chevron
Matt and Bruce capture for lessons learned – No N@ pressure push last night no steam in plant – no progress for 12 hours on Crude Unit, delta tech sent away due to no fitter support. Still connecting low point bleeders that were said to be completed two shifts ago. As a group we need to fix this for next shutdown.		X	
Clean up piping for West side was missing. Had to build it again.		X	Budget for re-build at each event. Alternative is secure it someplace permanent.
Primavera for westside systems didn't allow Ops to look at QA/QC by plant and system.		X	Need to work with QA/QC to organize systems differently in database.
never ever ever ever ever ever do a hot tap during TA		X	Contractors did not perform hot taps well and are not used to doing them while the plant is down
All control valves need to be on the control valve list. If control valves are pulled but not on the repair list, do not service.		X	put all valves on the valve lists. If valves are part of a piping job, do not service because no parts are available.

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)	
Facilities plan in the asphalt plant was bad to the ass	X		good job, worked well for Maintenance, contractors, meetings	
Asphalt complex worked well, everyone in one spot	X			
Use a router instead of running ten separate cables to each trailer.		X	use in future T/A's	
Planners need to be in a separate trailer by themselves. Issues with being in meeting trailer.		X	move next T/A.	
morning meeting smelled bad, maybe too much people, stuffy and hot		X	do we need that many people?	
Taj Mahal dust containment worked well	X		expensive but worked well, transfer bin area	
Pad management between D&R/RLOP worked well.	X		easy to tell where equipment was and whether it needed repairs.	
Overhead crane at wash pad broke down causing slowdown. Had to bring in Bigge cranes to support		X	Determine if any PMs should be done pre-turnaround to insure the reliability of the overhead crane.	
Need a night time blast pad manager in addition to day time manager		X	removed due to resource constraints. Need to have one in future event	
Use of cogen lot for overflow of bundles and parts worked well	X		continue practice	
better material management with contractors to check out parts. Lots of lost parts after contractors take material for jobs		X	fix so we don't waste money and time on parts	
contractors need a list of MR's or a copy. Figure out how to include with EWO's.		X		
Good material support with Eddie	X			
Bringing in new HM's worked well. New HM's did a great job. Good learning experience.	X		continue practice	
Need to make sure to have the correct ratio of experienced HM's to new HM's		X	Check during staffing portion	
staging hazards and obstacles were well marked in the field	X			
Meetings went well, morning meeting kept to 1/2 hr or less, TAW's were short b/c TAW's were reviewed early. Right people involved in all meetings.	X			
East side extra work meetings were well run, with people bringing data and making data-driven decisions.	X		Helps keep meetings on track and allows us to make decisions quickly and get back to work.	
good support from DRB on extra work during the event	X		empowered core team to make decisions	
morning meeting too close to contractor tail gate		X		
Smaller Tyvec was not available. The 4XL that were available were unsafe to work in.		X	Order more of smaller sizes.	
Days Maintenance/Ops workscope did not match nights Maintenance/Ops workscope. Priorities left for nightshift not always followed.		X	ex loopseal, issues with working only jobs on nights, days.	
Maintenance/ops meeting at midnight worked well at 12:30 for updates/priorities	X		helped make sure we were working on the right jobs.	
Good communication between head mechanics, rams, contractor foreman and Operations	X			
PSSR exception items should be noted by IMPACT and entered into the PSSR database by IMPACT.		X		

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	East	West	Recommended Resolution (optional)
No clear scope for Temp Piping. Had many late hits.		X	X	X	Need clear drawings of temp piping in advance to eliminate late additions and help provide a correct estimate.
temp pipe (6") built in 5 H2S that was never used ~200ft		X	X		should be an LI
Significant changes in temporary piping just prior to shutdown.		X	X		
Lots of temp pipe revisions; pipe should be laid out a few months ahead of time giving all crews time to walk and submit changes EARLY.		X	X	X	Ops should walk and create drawings prior to laying out the temp pipe.
better way of handling pump out header, possibly two separate dedicated sides.		X	X		one header forced vacuum and atmospheric contamination. Battled each other.
Utilize utility spool at plot limit for rundown cleanup	X		X		
Philosophy of blinding PLM vs internal LOTO's need to be revisited. West side was able to introduce steam and start initial steps due to using IMPACT TA philosophy. Using PLM made release of equipment later and was more cumbersome on back end.		X	X		RLOP and FCC have both used internal LOTO even though it has required numerous LOTO's of 200 to 300 points.
Diconnect between primavera blinding and actual plot limit blinding.		X	X		need to define strategy in future T/A's. Have philosophy meeting with ops, ops OA, planner, etc prior to T/A.
Plot limit blinding did not fit template in primavera		X	X		new template if boundary blinds are used?
Operations thought plot limit blinds worked well from cleanup and safety perspective	X		X		
Westside extra valves were entered too late, caused valves to be close to critical path.		X		X	Ops Coordinator too busy to enter valves, maybe STL or OA could enter?
Eastside extra valves captured early in the Maintenance window and TAW's entered by Operations	X		X		
TAW valves found very late in TA - most should have been identified during cleanup phase		X	X	X	
Ops Nat Team Meetings helped with ops. Event alignment and resolving issues. Execution OAs were put on special assignment to focus on turnaround.	X		X	X	Consider again for next turnaround
Certain clean up steps take a lot of extra time		X	X		Ops should continue to work with 4CU BIN on improving clean up procedures to make sure we are minimizing clean up times.
Bundles and equipment in 4CU were very dirty.		X	X		Understand impact of shortening diesel flush to 6hrs vs past practice. Lots of contractors mentioned equipment seemed dirtier than in the past.
Clean up water from D&R high in mercury, almost causing a permit exceedence in bioreactor		X	X	X	Develop a plan to segregate D&R clean up water so it can be managed for mercury issues.
good job by Operations of updating permits at start of shift.	X	X	X	X	PED had some issues on eastside
JHT distillation released late		X		X	
Blast resistance trailers were not used by operations, used for tags and plant protection.		X	X	X	blast proof trailers are extremely expensive and should not be used if not required.
In JHT Currently, operators input incrementally lower temperatures and if they get busy, cooling down can be delayed.		X		X	Consider adding automatic cool down to JHT board (input desired temperature and time to reach that temp) like 5 Cat has.
Blinds list could be improved for both the t/a and fire, both sides.		X	X	X	
Eastside blind lists were linked in primavera to the P&ID, easy to see what work is associated with each system	X		X		
tag tracking gaps. More done that logged if delays in turning in tags		X	X	X	may not be a way to completely remove gaps.
Operations resources not involved in planning came in late in T/A exectution and wanted changes vs what planned		X	X		
Need to talk earlier on recovered oil management		X	X		
decrease recovered oil 1 year prior to t/a		X	X		
increased manpower on ops coordinator early. Helped get everyone up to speed and better knowledge of T/A workscope	X		X		keep up practice in future T/A's

good to dedicated OA's to T/A for major events,	X		X	X	could be used in one off T/A's like rheniformers as well, use an exempt ops person 25-50%
Designate an Operator with PSM background to PSM management, yellowlining, MOC's, PSSR's. Bring in a month or so before the T/A.		X	X	X	
dedicated ops resources for LPS worked well.	X	X			
Current assignment of roles and responsibilities in Operations is good.	X		X	X	
job quick scope guides were helpful for Operators. Useful in reviewing field jobs with contractors	X		X	X	1st time, do in future T/A's
had lack of nitrogen and management of nitrogen issues. Air products ran out due to high amounts of nitrogen used.		X	X	X	need better plan for next T/A. maybe we look at having some tanker trucks spotted during cleanup. Have a dedicated nitrogen truck for the 4 CU.
GHT ran while 5H2S down worked well	X		X		
V-1671 off gas routes to JHT, needs to be in procedure to change routing once JHT is out of service.		X	X		
consider circulating to remove coke out of the vac bottoms prior to lighing off furnaces		X	X		
need a true definition of what yellow lining means. Different opinions between Ops, management, maint, etc. confusion with PSSR process and yellow lining.		X	X		define in future events
could use an operations checklist for transition from s/d to live plant. Maybe operations safety discussion once final PSSR is signed.		X	X	X	
Final PSSR should include nightshift walkthrough as well as day shift.		X	X	X	could miss lighting
consider use of CSE's to help with managing pof alarm overload (day and nights0		X	X		

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)
As on previous shutdowns, cleanliness expectations for equipment were unclear to Veolia requiring re-work		X	clear communication
Veolia needs to provide T/A to show what pressures they're blasting at.		X	Work with Veolia to provide pressures.
Timec Tower underperformed on column work		X	
Information seemed to get lost when communicated through Timec foreman, Timec column supervisor to Timec workers. This lead to extended C-240 cleaning time due to confusion.		X	Make sure instructions are well understood by workers or use a different company for columns.
3 s/c draw ti missed by TImec. Didn't put back in after hydrotest		X	
numerous issues with WWW - bad fit up on prefab pipe, not clear or accurate updates		X	Was this the pre-fab that WWW did or that the project had made at outside shop? Not clear
WWW had very little rework on LTS and worked well in tight area on LTS	X		
Good response to void hole inspection by Welltech - don't lose entry.	X		Consider completing again prior to next turnaround
Bay Valve could not handle PRD work at shop		X	Do not give them RLOP and D&R in the future
Bay Valve forgot to install a bellows kit that was required on a PRD		X	Kind of a one off situation due to new valve being on site and then late work adding bellows seal.
Bay valve had valves they said they could fix but changed mind during the T/A		X	Need clear direction on whether valves are repairable or if new valves should be purchased.
Lots of bundles damages, rigging, wash pad, more handling than may be required		X	Shad input email By my rough count from the existing RLOP exchanger TAWs, I believe there are 26 exchangers that have been handled less than adequately during our event. Is there a summary for D&R? • This amounts to 30 components with varying types of avoidable damage ranging from mechanically damaged tubes to broken welded valves • The total number of mechanically damaged tubes so far is 139 • The majority of damage has been while removing the bundles, though this can happen just as easily during installation • Perhaps the ones on this list are the difficult to rig or pull/stab compared to others • I don't have a solution, but I think this is worth a look.
CSI resources severely strained due to expanded inspection		X	need to resource load to cover a certain percentage of expanded inspection. Ended up at 3x expected inspection.
Koch did a very good job on C-1100, C-1160.	X		consider using them for all columns.
Good idea/decision to bring in Harder to run V-430. They did a good job.	X		
Harder did a good job on V-430. took on work very late in t/a	X		
JT Thorpe's dryout recommendations were not feasible for 4CU startup.		X	Work with JT Thorpe to either select more appropriate materials for repair or relax dryout requirements.
JT thorpe did not perform well on LTS civil / structural work. Issues with building permit		X	
BFM logistics went well with Maint. Work well.	X		
Cat services did an excellent job on R-210, V-451, caustic scrubber. Good documentation	X		
Roscoe did a good job with building permit services.	X		
Air products needs extra staff. Had issue with 12 hr max work schedule and only one operator.		X	

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)
Nubbins on JHT HEX were cut, approved and sat for 2+ weeks. At sign off for bundle stuff they were deemed not good enough		X	have all parties sign off officially on nubbins removal prior to machinists de-mobing
orifice plates that were bad were identified late		X	as cheap as plates are they should all be ordered new prior to TA
communication betweens days and nights on I&E was not good. Many loops checks redone 3 or 4 times		X	improve communication
Some small relief valves were purchased prior to the shutdown to save one fresh air job per relief valve. However, most of these valves were not completed this way and did not save a fresh air job.		X	Consider NOT replacing any relief valves because of a fresh air job. It seems to be too hard to coordinate this during the shutdown. This would save engineering (on a big event) hundreds of hours.
execution EWO's completed quickly, usually within a day	X		good job by engineering
good work by DED and PED to develop and execute a quick repair plan on 1 S/C sump	X		
Documentation for new equipment coming from DED was the best Inspections has seen EVER	X		keep up in future events.
DED trailer was crowded and gross and smelled bad.		X	need a bigger trailer or two separate trailers.
Designs smells after week one, needs a double wide		X	need a bigger trailer or air freshener
DED had civil engineer on staff during execution that helped with permits	X		
DED management needs to provide better resources during planning stage.		X	
Good continuity with PED resources and DED resource	X		
difference of opinion between nights and days as to whether closure was acceptable. Once a vessel, column, etc is signed off it should be closed - not reinspected		X	
Some issues with equipment okayed for cleanliness by days and then nights wouldn't sign off		X	make sure days/nights understands cleanliness requirements. Have some experienced people on nights.
Expected amount of DMDS (theoretical plus contingency) was not enough.		X	DMDS can be returned for a restocking fee so consider ordering significanly more than expected to reduce risk of damaging catalyst.
Contingency bubble caps ended up not coming with risers or strongbacks		X	Make sure Koch is aware that the entire assembly is required, not just the cap.
PED had to modify the flare plan at least 3 times due to changes in the P3 schedule.		X	Consider changing due date for flare plan until after P3 schedule finalization in order to minimize resource load on PED.
due flare plan once before each interation of the Primavera schedule. Waste of time		X	

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)
agreement during core team planning that inspection results would be available 12-24 hrs after inspection. More often was 48-96 hrs making discovery reco and quick repair decisions difficult (west)		X	let core team know preliminary results as soon as possible (see RLOP). Not necessary to wait for an official report
need to understand our inspection philosophy regarding plugging obstructed tubes		X	do we need to plug obstructed tubes? Do we need to expand to 100%?
eddy current reports need to be shared with engineering and the core team as soon as they are available.		X	hard to get reports from inspections. Delayed DED calculations and path forward on corroded bundles.
E-912 inspected prior to the T/A and was good. Inspection in the T/A was bad.		X	need to use the proper inspection techniques predown to avoid adding work we could have known about.
Need to have coating for deaerators built into plan. Not enough time to add during execution		X	Inspections needs to request coating on the IWO before input freeze
4 S/C piping unexpected.		X	Maybe include TML's on straight runs of pipe known to be susceptible to sulfidation. Use on line monitoring similary to ISO-7.
schedule was not followed during S/D. Equipment was not turned over as the schedule instructed.		X	Use schedule to better predict staffing increases and decreases. Staffing is built based on the schedule and becomes impossible to follow when equipment release becomes compacted.
provide a work location for FER inspector at the bundle pad with computer drops and printer. This slowed the release of equipment from the pad.		X	connex space was not adequate to accommodate all personell from north and south yard events.
inspections and DED did a good job of working together on TAW's prior to submitting to core team	X		saves time in TAW meeting
Inspection to share inspection results with DED. DED to write the recommendations.		X	hard to get reports from inspections. Delayed DED path forward.

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)
RROT Meeting pre-turnaround helped with refinery-wide communications	X		Consider completing again prior to next turnaround
Oils Planning involvement early on	X		Consider again for next turnaround
Early discussion on PVDs resolved issues and got teams on same page	X		Consider completing again prior to next turnaround
Flare plan workshops were used to resolve issues and get teams on same page	X		Consider completing again prior to next turnaround
Early meeting between Plant Protection and IMPACT to resolve any 91 gate issues.	X		Consider again for next turnaround
Need a dedicated tank plan next turnaround, follow plan		X	had tank plan but did not follow. Recovered oil issues.
Rework on Fire Marshal Housing (D&R). Need privacy for HIPA compliance.		X	Impact to plan for their needs as part of logistics with inspections etc.
HES entry permit changes, and PPE matrix changes did not go well. Too close to the T/A			
Reliability engineer non existant before T/A		X	
Metallurgy support during extra work meetings was good	X		
City permitting process continues to be an inefficient and confusing process. Include the resolution of Engineer on Record (ownership) after CVX takes possession of materials fabricated at outside shops.		X	Engineering team working to resolve issues and streamline process along with Building Permit Group.
good to have building permit inspections 24/7	X		use in future T/A's
Still chasing permit issues months after the T/A		X	Need to have city and QA/QC close permits right after the end of the T/A.
Need a well defined entry permit process - particularly furnaces		X	Issues with confined space during T/A entries. Outside doors on furnaces, cermic fiber for work near furnace.
qa/qc did a good job, chop, etc.	X		
PSM database (MOC) bogs down when many log on. This affects PSSR timing at the end of a large turnaround as people either can't get on or the system slows down.		X	New web based system to be installed in 2012/1013. This should eliminate the problem.

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)
Good response to void hole inspection - don't lose entry.	X		Consider completing again prior to next turnaround
diesel pump was labor intensive for flareless		X	consider a recip pump
configuration of pump on condensor was mounted too high and level was difficult to gauge for flareless setup in 4CU		X	different type of pump that is on ground and not on trailer
Flareless Project: Condensate blowdown from the plant was pumped to V-1198 and desalter and overheated those vessels.		X	Condensate blowdown from the plant should also be routed through a cooler to minimize load on relief.
C-1180 cleaning took 14-17 days(at least) definitely need a better plan next time.		X	
C-1180 took forever to clean		X	consider replacing with a pipe or empty vessel to allow easier cleaning with no internals.
C-1180 cleaning took 14-17 days(at least) definitely need a better plan next time.		X	
Need to replace mule ears next T/A. Kept leaking and had a small fire during start up.		X	Add to worklist. Beauregard needs to be stronger during worklist development
C-1100/1160 blind lists need to be at the 2nd flange back for spargers and injection quills		X	
Plan on replaceing C-1100 1 S/C sump fully next time		X	1 S/C had a temporary repair put in by welding plate around the exisiting sump. Next time plan to fully replace with a new sump.
Koch given old drawings for C-1160 that didn't show the new hardware installed in 2007		X	make sure C-1100 and C-1160 drawings given to contractor are up to date
C-1110 ammonia injection line needs to be removed - speculative at best		X	
hydroblasting on E-1190's took forever		X	consider using curran next T/A. Consider adding valves to allow isolation and cleaning on the run.
FC020a and FC020b needs to be removed		X	
install bigger bleeders all over 4CU		X	put on worklist for next t/a
Plan temporay power cutover and Electrical Bus work early in the shutdown. This will allow for K-1171 or K-242 to take the K-3950 loads. Added to Impact Look back Phase 7		X	
temporary dewer (temporary nitrogen tank) for GHT worked well	X		
R-210 reactor 2" nitrogen hookup for cool down needs a special gasket		X	Need to have onsite, ended up delaying cool down.
R-210 cat dump method switched to flow bins from roll bins right before T/A. Extended duration of cat dump.		X	need to understand new environmental regulations
R-210 cat dump switched to wet vacuuming without Cat Services feedback. Wet vacuuming leads to high humidity so Cat Services can't enter reactor, increasing dump time.		X	Consult with catalyst dump/loading company about dump method. Cat Services would have been more comfortable with an inert vacuum procedure in this case.
JHT had unexpected corrosion to E-212's and E-213's		X	have a plan for the bundles next T/A.
Could have used two test rings for the E-213's so we can test two at a time.		X	would have saved money and time. Had to take heads back on and off a bunch of times.
C-240 took forever to clean		X	have a plan with the contractor prior to entering on what cleanliness we need. Contractor cleaned more than necessary.
C-240 used a stand pipe that wasn't planned before the T/A			
No previous shutdown information on amount of bubble caps that are usually neeeded as contingency. Was able to find surplus caps to make up for both C-240 and C-1190.		X	Expect to need ~5% of column's bubble cap assemblies as contingency unless otherwise noted.
For C-240 buy individual parts, not entire caps. Most of parts were not entirely used. Figure out what parts can be bought individually		X	Buy bubble caps next time.
C-240, C-1190 contingency bubble caps used.	X		make sure to have on hand for future T/A's. Don't use Koch, they are 5x more expensive than Sulzer and APS.
V-430 PPE matrix could use a tweak for coalescer pad removal. Usually needs to be done in fresh air.		X	

Work in V-430, E-410's went well and good communication between all groups. Same with the 4S/C job.	X		
Would have been better to have one contractor work P-411's e-410's and V-430 due to proximity		X	couldn't do this T/A due to time constraints but would be good to implement on future T/A's.
E-410 exchanger needs a special spacer blind. Need to have a plan before the T/A		X	

Lessons Learned, Delays, what went well and Budget Buster	Plus	Delta	Recommended Resolution (optional)
hydrotesting on LTS project did not go well		X	need a hydrotesting plan and hydrotest blind list for large piping jobs. Hydrotesting needs to be factored into the engineering. Look at when tie-in to existing lines.
LTS had portions that could have been executed pre-down.		X	Make sure to evaluate cap projects for possible pre-down work. Could have built a new E-1148 and had installed with BFW and Steam piping pre-down.
Need consistant ops rep throughout the planning and execution for projects. Single point of contact during execution		X	
PSSR exception items for capital projects need construction rep post t/a		X	
LTS closed out permit with zero non conformance	X		
LTS laid out ahead of T/A with drawings that were highlighted prior to the T/A where work took place.	X		
g-man did a good job on LTS. Hand drew ISO's to make field construction easier to follow.	X		